

CLAIMS

- add A1
add C17
- 5
- 10
- 15
- 20
- 25
- 30
1. A container handling system comprising:
 - (a) an extensible boom mounted so as to provide dumping access to a desired point of discharge for unloading a container of interest;
 - (b) a mechanized arm arrangement carried by said extensible boom and having a free end, said arm arrangement being rotatable in a vertical plane encompassing container-engaging, container-releasing, lift and dump positions;
 - (c) a container grabber device for grabbing and releasing containers of interest carried by the free end of said arm arrangement;
 - (d) position sensing system for sensing the relative extension of said boom;
 - (e) position sensing system for sensing the rotational position of said arm arrangement;
 - (f) actuators for extending and retracting said boom, reversibly rotating said mechanized arm arrangement and operating said container grabber device; and
 - (g) a control system for controlling the operation of said container handling system.
 2. A container handling system as in claim 1 wherein said control system includes a speed controller for controlling the rotational speed of said mechanized arm arrangement based on sensed arm position.
 3. A container handling system as in claim 1 wherein said lateral position sensing system includes an angular displacement transducer.
 4. A container handling system as in claim 2 wherein said sensing system for sensing the rotational position of said arm includes an angular displacement

transducer.

5 5. A container handling system as in claim 1 wherein said actuator for reversibly rotating said mechanized arm arrangement is a hydraulic rotary actuator.

6. A container handling system as in claim 4 wherein said actuator for reversibly rotating said mechanized arm arrangement is a hydraulic rotary actuator.

10 7. A container handling system as in claim 1 wherein said lateral position sensing system includes a linear transducer.

15 8. A container handling system as in claim 5 wherein said mechanized arm arrangement includes a pair of spaced parallel shaped arms attached to opposite ends of an output shaft associated with said hydraulic rotary actuator.

20 9. A container handling system as in claim 1 wherein said mechanized arm arrangement includes a single shaped arm member operated by a hydraulic cylinder.

10. A container handling system as in claim 1 wherein said control system for controlling the operation of said container handling system includes a programmed microprocessor.

25 11. A container handling system as in claim 10 wherein said control system includes control means for damping the action of mechanical parts toward the extremes of travel thereof.

30 12. A container handling system as in claim 6 wherein said control system for controlling the operation of said container handling system includes a programmed microprocessor.

13. A container handling system as in claim 12

wherein said control system includes control means for damping the action of mechanical parts toward the extremes of travel thereof.

14. An automated container handling system for emptying containers of interest into a charging hopper of a side loading refuse vehicle comprising:

- (a) a laterally extensible boom device mounted on said vehicle close to a desired loading area;
- (b) a mechanized loading arm device having a fixed end carried by said extensible boom device and a free end, said arm device being disposed for rotating in a vertical plane encompassing container-engaging, release, lift and dump positions;
- (c) a container grabber device for grabbing and releasing containers of interest carried by the free end of said arm device;
- (d) position sensing system for sensing the relative extension of said boom;
- (e) position sensing system for sensing the rotational position of said arm device;
- (f) actuators for extending and retracting said boom, reversibly rotating said mechanized arm device and operating said container grabber device; and
- (g) a control system for controlling the operation of said container handling system.

15. A container handling system as in claim 14 wherein said control system includes a speed controller for controlling the rotational speed of said mechanized arm arrangement based on sensed arm position.

16. A container handling system as in claim 15 wherein said control system includes a speed controller

for controlling the rotational speed of said mechanized arm arrangement based on sensed arm position.

17. A container handling system as in claim 14 wherein said lateral position sensing system includes an angular displacement transducer.

18. A container handling system as in claim 14 wherein said actuator for reversibly rotating said mechanized arm arrangement is a hydraulic rotary actuator.

19. A container handling system as in claim 16 wherein said actuator for reversibly rotating said mechanized arm arrangement is a hydraulic rotary actuator.

20. A container handling system as in claim 14 wherein said lateral position sensing system includes a linear transducer.

21. A container handling system as in claim 18 wherein said mechanized arm arrangement includes a pair of spaced parallel shaped arms attached to opposite ends of an output shaft associated with said hydraulic rotary actuator.

22. A container handling system as in claim 14 wherein said mechanized arm arrangement includes a single shaped arm member operated by a hydraulic cylinder.

23. A container handling system as in claim 14 wherein said control system for controlling the operation of said container handling system includes a programmed microprocessor.

24. A container handling system as in claim 23 wherein said control system includes control means for damping the action of mechanical parts toward the extremes of travel thereof.

25. A container handling system as in claim 19

wherein said control system for controlling the operation of said container handling system includes a programmed microprocessor.

26. A container handling system as in claim 25 wherein said control system includes control means for damping the action of mechanical parts toward the extremes of travel thereof.

27. A container handling system comprising:

- (a) a mechanized arm arrangement having a fixed end and having a free end, said arm arrangement being rotatable in a vertical plane encompassing container-engaging, container-releasing lift and dump positions;
- (b) wherein said fixed end of said arm arrangement is attached to a rotary actuator for carrying and reversibly rotating said mechanized arm arrangement;
- (c) a container grabber device for grabbing and releasing containers of interest carried by the free end of said arm arrangement;
- (d) actuator for operating said container grabber device; and
- (e) a control system for controlling the operation of said container handling system.

28. A container handling system as in claim 27 wherein said control system includes a speed controller for controlling the rotational speed of said mechanized arm arrangement based on sensed arm position.

29. A container handling system as in claim 28 wherein said sensing system for sensing the rotational position of said arm includes an angular displacement transducer.

30. A container handling system as in claim 27

wherein said actuator for reversibly rotating said mechanized arm arrangement is a hydraulic rotary actuator.

5 31. A container handling system as in claim 28 wherein said mechanized arm arrangement includes a pair of spaced parallel shaped arms attached to opposite ends of an output shaft associated with said hydraulic rotary actuator.

10 32. A method of operating a container handling system for lifting and dumping a container of interest utilizing a pivoting mechanized arm arrangement carried by an extensible boom, in turn, mounted so as to access a desired point of discharge, for unloading a container of interest, said mechanized arm arrangement carrying a
15 mechanized container grabber at the free end thereof, said method comprising the step of pivoting said mechanized arm arrangement utilizing a hydraulic rotary actuator.

20 33. A method as in claim 32 further comprising the steps of obtaining positional information relative to boom extension, and the angular position of said mechanized arm arrangement utilizing one or more transducer devices selected from linear and angular displacement transducer devices.

25 34. A method as in claim 33 further comprising the steps of:

- 30 (a) storing in memory the positional extremes of said telescoping boom and mechanized arm arrangements;
- (b) comparing the instant positional data with the data relative to said extreme positions; and
- (c) electronically causing one or more of said mechanisms to slow when approaching the extreme

position thereby preventing the slamming of
parts into stops.

5 35. A method as in claim 27 wherein one of said
extreme positions is the noted position of pick up of the
then relevant container of interest.